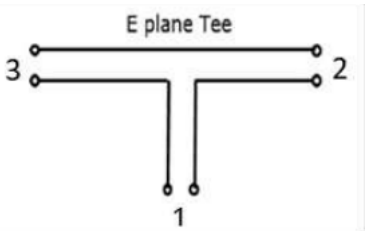
SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Electronics & Telecommunication Engg **Academic Year: 2022** **Duration: 3 hours**
Date: 11.01.2023
Time: 10:30 am to 01:30 pm
Subject: Microwave Engineering (Semester VII) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper contains 02 pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Question No.			Max. Marks
Q1 (a)	i.	A WR62 waveguide has dominant cutoff frequency of 9.49 GHz if "b" dimension of the waveguide is 7.9mm what is the "a" dimension in mm?	[02]
	ii.	What is the need for ABCD parameter? What is the condition of reciprocity in terms of ABCD parameters and S parameters?	[03]
	iii.	For a waveguide with dimension 40mm X 20mm has a wave with electric field, $E = C \sin(25\pi x) \sin(50\pi x)\, e^{-j\beta z}\widehat{az}$, Determine the mode of the wave.	[05]
Q1 (b)	A load of 21+89j needs to be matched to 100 Ohm transmission line using Single Stub Matching. Stub used is Shorted and parallel to the load. Calculate the distance from the load at which the stub should be connected and the length of the stub. Consider frequency of 2GHz.		[05]
Q2 (a)	Describe working of Hybrid Ring /Rat race coupler Using following points: a) Working Principle with diagram (4 marks) b) Applications (1 mark) **OR** Describe the working of Circulator and demonstrate how circulator can be used as Magic Tee.		[05] [05]
Q2 (b)	For the diagram given derive the S-Matrix 		[10]

Q3 (a)	Write a note on magnetron with respect to following points: i) Diagram (2 marks) ii) Basic Working (3 marks) **OR** Write a note on TWTA with respect to following points: i) Diagram (2 marks) ii) Basic Working (3 marks)	[05]
Q3 (b)	i. With the help of diagram explain working of two cavity klystrons ii. A two cavity Klystron has following parameters: V_0=1900V R_0=40kohm I_0=20mA f =2 GHz Gap Spacing in either cavity: d= 0.5mm Spacing Between two cavities: L=4cm Effective shunt impedance, excluding beam loading: Rsh=30kohm Find: i) The input gap voltage to give maximum voltage V2 ii)Voltage gain ii) Efficiency	[05] [05]
Q4 (a)	Explain briefly working of MESFET and HEMT **OR** Explain briefly working of semiconductor-based microwave source.	[05]
Q4 (b)	With the help of diagram, describe the measurement setup for measuring i)Frequency ii)Dielectric Constant	[10]
Q5 (a)	Briefly describe the medical applications of Microwave Engineering. Also give your thoughts on impact of microwave radiation on human body.	[05]
Q5 (b)	i. If TE 10 is the dominant mode, the cut-off wavelength is given by $\lambda_c = 2a$.Comment on dimension of the waveguide. ii. List the advantages and disadvantages of microwave communication.	[05] [05]

All the Best!